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1 Common Gateway (CG)

The Common Gateway combines the different IP Gateway functions (HG3530, HG3550, HG3540 and HG3570 in one SW core.

Each sub-function (e.g. HFA or SIP) can be configured on one single HG3500 board,

The CGW SW can run on existing STMIV2 cards or on the „new“ STMIV4 card.

1.1 Gateways

The following gateways are supported in HiPath 4000 V4:

- HG 3575 V4

  with the boards

  – NCUI2+ (Q2305-X35 and Q2305-X40)

  – NCUI4 (Q2324-X and Q2324-X10)

- HG 3550 V1 (STMI (Q2303-X10) and (Q2303-X20))

  For IP trunking only.

- HG 3500 V4 (Common Gateway)

  with the boards

  – STMI2 (Q2316-X and Q2316-X10)

  – STMI4 (Q2324-X500 and Q2324-X510)

Difference NCUI2 and NCUI2+:

The NCUI2+ has more RAM (128 MB instead of 64 MB) and the FEPROM more memory capacity (32 MB instead of 16 MB)

Difference between NCUI2+ and NCUI4:

The NCUI4 (Q2324-X10) has 5 DSPs ,the NCUI+ (Q2305-X40) only 4.

The NCUI4 has faster DSPs (720 MHz instead of 500 MHz) and more memory (32 MB instead of 16 MB).

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The NCUI2 can be used for the migration!

1.2 Hardware and Loadware NCUI

New loadware (PZKNCI40) is available for the boards NCUI2+ and NCUI4 in HiPath 4000 V4 and later versions.

Board type	Part number	B channels
NCUI2+	Q2305-X35	60 B channels (2 DSPs)
NCUI2+	Q2305-X40	120 B channels (4 DSPs)
NCUI4	Q2324-X	60 B channels (2 DSPs)
NCUI4	Q2324-X10	120 B channels (5 DSPs)

Table 1-1 Supported NCUI boards

Board type	Loadware	Restricted B channels	Full feature scope
NCUI2+	PZKNCI40	x	Not possible
NCUI4	PZKNCI40		x

Table 1-2 Boards, loadware, B channels and feature scope

1.3 General Information

- HG 3575 IPDA will be upgraded to HG 3550 architecture. Basic functionality will remain the same. This hub serves as a basis for integrating other possible features.
- In contrast to HG 3500, there is no standby concept for HG 3575.
- The NCUI board is still configured with the AMO STMIB.

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1.4 Hardware and Loadware HG3500 V4

Until HiPath 4000 V3.0 was released, each feature had separate loadware. This loadware determined the function of the gateway (HG 3530, HG 3540/3550, HG 3570). In HiPath 4000 V4 and later, the various types of loadware are consolidated into a common loadware for STMI2 and STMI4. With this loadware all features are available on the board.

Board	Part number	B channels
STMI2	Q2316-X	60 B channels (2 DSPs (30 B channels per DSP))
STMI2	Q2316-X10	120 B channels (4 DSPs (30 B channels per DSP))
STMI4	Q2324-X500	60 B channels (2 DSPs (30 B channels per DSP))
STMI4	Q2324-X510	120 B channels (5 DSPs (30 B channels per DSP))

Table 1-3 Supported STMI boards

Board	Loadware	Restricted B channels	Full feature scope
STMI2	PZKSTI40	x	Not possible
STMI4	PZKSTI40		x
STMI1			HG 3550 V1.0 (only H323 trunking)

Table 1-4 Boards, loadware, B channels and feature scope

1.5 General Information

- The HiPath 4000 V4 common gateway HG 3500 consolidates existing VoIP gateways into a single gateway.
- This forms a common architecture based on HG 3550 V2.0 for HiPath 4000 V3.0.
- All functions provided by the HG 3530, HG 3540, HG 3550 and HG 3570 gateways, including redundancy and load sharing, are retained.
- The HiPath 4000 V4 system software has been enhanced to support the “mixed“ common gateway. This means that all sub features (trunking, VoIP subscriber, IPDA and WAML) can be used in parallel on a board.

Restriction: Only one trunking protocol may be configured for each board. There are no restrictions on interworking with other functions.

- The HiPath Feature Access (HFA) standby concept will be made available for other functions.

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1.6 Restrictions

CQR Viewer

The CQR Viewer application is only supported for HFA (FUNCTION=HG3530) and IPDA (FUNCTION=HG3570), not for trunking (FUNCTION=HG3550).

1.7 Impact On Existing Functions

- Impact on DLS: None.
- Impact on terminals/clients: None. All HiPath 4000 V3.0 IP telephones are supported. OpenStage telephones are also supported.
- Impact on ACL: None.
- Impact on CDR: None.
- Impact on analysis options: With the common gateway, all sub features now include comprehensive HG 3550 analysis options.
- Impact on encryption: The common gateway alone no longer supports the HiPath 4000 V3.0 encryption feature. This function will be available again when signaling and payload encryption are released.
- Impact on HFA mobility: None. This feature remains unchanged and continues to be supported.
- Impact on the standby board concept: Based on the HiPath 4000 V3.0 HFA standby concept in HG 3530, the functional scope of the STMI board is expanded to match that of the HG 3500.

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1.8 Number of B Channels Dependent On Enabled Features

The following two tables provide an overview of the number of available B channels that are dependent on enabled features.

1.8.1 STMI2 (Q2316-X10) / NCUI2+ (Q2305-X40)

STMI2 (Q2316-X10) / NCUI2+ (Q2305-X40)	**Maximum number of parallel B channels**
Plain + SRTP + QDC + DMC	60
Plain + SRTP + DMC	60
Plain + QDC + DMC	85
Plain + DMC	90

Table 1-5 Maximum number of B channels dependent on the features enabled on STMI2 (Q2316-X10) and NCUI2+ (Q2305-X40)

1.8.2 STMI4 (Q2324-X510) / NCUI4 (Q2324-X10)

STMI4 (Q2324-X510) / NCUI4 (Q2324-X10)	**Maximum number of parallel channels**
Plain + SRTP + QDC + DMC	100
Plain + SRTP+ QDC	120
Plain + DMC	100

Table 1-6 Maximum number of B channels dependent on the features enabled on STMI4 (Q2324-X510) and NCUI4 (Q2324-X10)

In the case of V4 boards (i.e. STMI4 and NCUI4), the number of channels is **solely** dependent on the DMC. No other features have an impact on the number of available B channels.

In other words,

- all feature combinations without DMC: 120 B channels
- all feature combinations with DMC: 100 B channels

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2 Architecture and System Requirements

2.1 Prerequisites

Prior to installing IP line gateways at a customer site a network assessment is required that will determine whether the customer's IP network is capable of supporting IP phones. This network assessment will analyze the IP network and determine parameters like jitter, packet loss, available bandwidth, supported QOS mechanisms and assess overall VoIP readiness.

2.2 Power Requirements

The HG 3500 line gateway is a standard HiPath 4000 card that plugs into standard HiPath 4000 enclosures (AP 3300 and AP 3700 Access Points). However, HG 3500 cards require more than average power due to components with high power demands (DSPs). This limits the total number of HG 3500 cards to a maximum of **6** cards per AP 3700 IP (9 slot), **10** cards per AP 3700 (13 slot) and **5** cards per AP 3300.

2.3 Network Requirements

The HG 3500 place high demands on the network via which it is coupled to its IP endpoints. Just like Voice-over-IP data streams are sensitive to packet runtime, runtime variance (jitter) and packet loss.

The availability and reliability of a HG 3500 system depends heavily on the quality of the IP network used.

Therefore, the network must be examined prior to installation with regard to its suitability for VoIP for the use of HiPath 4000 HG 3500. More details can be found in the HiPath Network Analysis Guide.

All HiPath 4000 components **must** be connected to their own ports on Layer 2 switches.

Using hubs together with HiPath 4000 can cause problems. For this reason, they are not permitted for use in corresponding VoIP scenarios. If hubs are available, they should be replaced with a switch.

In order to achieve a high Quality of Service (voice quality/real time behavior of signaling), the support of IEEE 802.1 p/q VLAN Tagging and IETF RFC 2474 DiffServ is recommended.

Note
If an access point is connected over **W**ide **A**rea **N**etworks in which the available **bandwidth is extremely restricted**, the control information (signaling) and voice data (payload) for access points must be given priority over other services.

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Frequently, only explicitly familiar TCP/IP or UDP/IP port numbers are supported in the customer LAN for security reasons. All others are then blocked in such cases. Precisely which port numbers must be supported for the HiPath HG 3500 component in the network is described in Section 16.1, “Gateway Port Allocation”.

2.4 Basic Configuration Requirements

For a HG 3500 line gateway to be operational on a live IP network the following parameters have to be configured.

Every HG 3500 requires configuration data which must be coordinated with the network administration of the customer, documented and configured precisely as agreed.

The following data must be specified for every new node in the customer LAN:

- IP address of the node
- Netmask for the network in which the new node is added
- Default router via which the other networks can be reached

Furthermore, the way in which Quality of Service is supported must be clarified for all networks in which HiPath 4000 components are installed. As HiPath 4000 supports IP distributed architecture processes for controlling the Quality of Service in a network on various protocol layers, the following must be clarified:

- Is IEEE 802.1 p/q VLAN Tagging (Layer 2) supported?

  To this end, it is crucial that all network components with which a HiPath 4000 component communicates must support the standard and be configured accordingly. If the network contains nodes (particularly switches and routers) which do not support IEEE 802.1 p/q, VLAN tagging must remain deactivated. The traffic type is assigned a fixed priority value.

- If DiffServ pursuant to RFC 2474 is supported, which CodePoints can be utilized?

  In the HiPath 4000 components, TOS bytes must be set to partially differing values for the following traffic types. The default values assume DiffServ support on the part of the network and realize the Quality of Service strategy of Siemens AG.

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Note
The TOS byte can be read in a number of different ways:

- Two 3-bit values for precedence and priority
- One 6-bit value as a combination of both 3-bit values (DiffServ CP)
- The entire TOS byte including two fill bits

For IPDA, the entire TOS byte is specified. The two least significant bits are always set to zero.

See Section 8.1, “Key Words”.

On the HG 3500 these parameters are set by using standard switch administration.

2.5 Bandwidth Requirements

The actual bandwidth per active payload connection depends on the selected encoding algorithm and the specified sampling time.

2.5.1 Encoding

G.711, G.723 or G.729 encoding can be selected.

- G.711 encoding generates a net data rate of 64 Kbps,
- G.723 compresses to 6.4/5.3Kpbs and
- G.729 compresses to 8Kpbs (see Table 2-1 IP Overhead and BW per Connection for actual data rates).

Wideband codecs according to G.722 are supported between optiPoint 410 IP phones. The required bandwidth is the same as for G.711. Note that the gateway itself does not terminate G.722 voice payload.

Note that there is virtually no delay introduced in generating G.711 encoding from TDM voice packets (Algorithmic Delay = 0 ms).

2.5.2 Sampling Time

Voice needs to be digitized before it can be assembled into IP packets.

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For telephony applications, voice is sampled every 125 µs at 8bits. It would not make sense to package each individual 8 bit sample into an IP packet. Instead, for G.711 encoding at least 240 8 bit samples are combined into an IP packet.

It takes 30 ms to acquire 240 voice samples.

The Sampling Time is defined as the time it takes to sample a specified number of voice samples that are sent out in **one** IP packet.

It is obvious that the longer the sampling time, the smaller the IP overhead gets. Thus, in order to minimize bandwidth, the sampling time will have to be increased.

However, increasing the sampling time will increase the overall delay!

Important
There is always a tradeoff between minimizing the delay versus minimizing the required bandwidth.

For IP line gateways the sampling time can be set between 10 ms and 90 ms depending on codec type.

2.5.3 IP Overhead

The IP overhead includes the Real Time Protocol (RTP), User Datagram Protocol (UDP) and IP headers as well as the Ethernet framing and additional octets for QOS Tagging.

A typical IP overhead value for G.711 is 30% (see Table 2-1 IP Overhead and BW per Connection for more details).

2.5.4 Required Bandwidth per Connection

The following table shows the required IP bandwidth and IP overhead per voice connection as a function of Sampling Time and encoding:

Encoding	Sampling Time	IP Overhead	BW per Connection
G.711	10ms	88%	120.0 Kbps
	20ms	44%	92.0 Kbps
	30ms	29%	82.7 Kbps
	40ms	22%	78.0 Kbps
	50ms	18%	75.2 Kbps

Table 2-1 IP Overhead and BW per Connection

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Encoding	Sampling Time	IP Overhead	BW per Connection
	60ms	15%	73.3 Kbps
G.729A	20ms	350%	36.0 Kbps
	40ms	175%	22.0 Kbps
	60ms	117%	17.3 Kbps
G.723 (6.4)	30ms	291%	25.1 Kbps
	60ms	146%	15.7 Kbps
	90ms	97.2%	12.6 Kbps

Table 2-1 IP Overhead and BW per Connection

Note that the bandwidth calculation is based on 70 bytes of overhead: RTP (12 bytes), UDP (8 bytes), IP (20 bytes), 802.1Q VLAN Tagging (4 Bytes), MAC (incl. Preamble, FCS, 26 Bytes).

Important
Bandwidth requirements assume **Full Duplex** operation!
When running Half Duplex, twice the bandwidth is required.

2.5.5 Voice Activity Detection (VAD)

Voice activity detection conserves bandwidth in the IP network during pauses in speech and can further reduce the required network bandwidth from 50% to 75% (see Section 6.9, “Voice Activity Detection (VAD)” for more details).

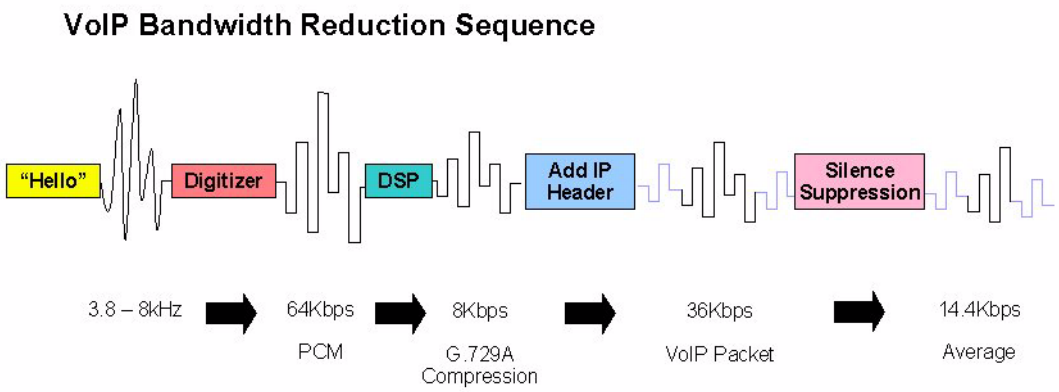

Figure 2-1 VoIP Bandwidth Reduction Sequence

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2.5.6 DMC Considerations

Whenever a DMC connection is established, a “Master Connection” is setup as well.

The master connection is following the same path as the signaling through all the gateways between to IP clients.

The master connection ensures that the necessary resources are always available whenever a feature is invoked that results in a multi party call (e.g. conference). There is also no delay for invoking these types of features because the connection is already setup.

However, there are drawbacks to the master connection concept as well:

- Additional bandwidth is required for sustaining the master connection
- Depending on the configuration significant delays and multiple hops can occur between IP clients when voice payload is using the master connection. Especially when IP end points are located on different IP Access Points on IP connected systems, delays may increase beyond acceptable levels.

In Figure 2-2 DMC and Master Connection the DMC and Master Connection is shown between two IP networked HiPath 4000 systems for a call between two IP clients (one on each system).

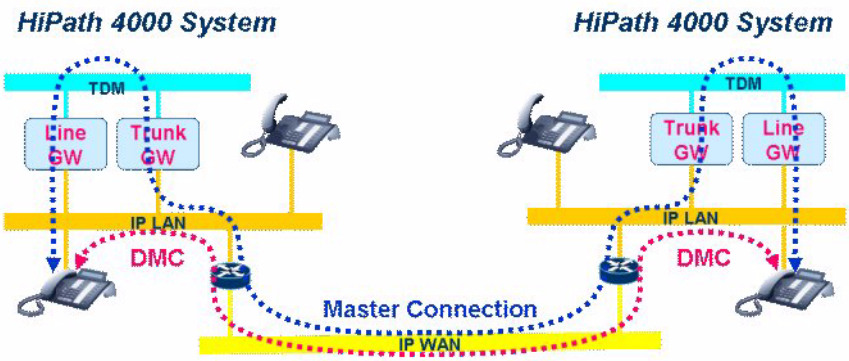

Figure 2-2 DMC and Master Connection

Enabling VAD will reduce the required bandwidth on the master connection to negligible levels.

Note that delays for each TDM to IP conversion accumulate. In the example above the master connection goes through 3 hops which will result in approximately 200ms end to end delay assuming G.711 encoding with 30ms sampling time and a high quality network (20ms delay). The DMC connection goes only through one hop resulting in an end to end delay of about 80ms.

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2.6 Traffic Considerations

From a trafficking point of view, HG 3500 IP line gateways can be treated like a trunk with either 60 or 120 connections. The number of connections required depends on the number of IP phones configured per HG 3500 and the traffic (C.C.S.) values of these phones. Using a standard ErlangB calculation allows determining the number of trunks/connections that are required on each gateway for a specific configuration.

The tools use a simplified approach and allow 240 standard users and 60/120 high traffic (e.g. call center agents) users on each gateway type. Note that you can mix and match standard and high traffic users but you will be limited to 60/120 users per gateway total. This ensures that call center agents will always be able to seize a line.

Capacities

A maximum of 240 IP clients can be configured per HG 3500 gateway.

Typically a 60 connections GW is sufficient to serve 240 at 6 C.C.S.. In case the users creating a higher amount of traffic, then a 120 connections GW will be required.

Call center agents are typically trafficked at 32 C.C.S. and thus require a connection on the GW for each agents. This will limit the number of call center agents to 60 or 120 depending on the HG 3500 type (60/120 connections).

Important
Mixing of regular users and call center agents on the same card is possible. However, in order to guarantee connection availability to call center agents at all times, regular users will be trafficked at 1 Erlang (36 C.C.S.)

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3 Capacities and Limitations

- The HiPath HG 3500 line gateway has the capacity to convert 60/120 connections into Fast Ethernet packets and provide TDM to IP conversion for 60/120 concurrent calls.
- The HG 3500 line gateway is only supported in the HiPath 4000 V4 communication platforms.
- The HG 3500 line gateway is supported in all IP distributed Access Points including AP 3500/3505 APs that were part of an upgraded v1.0 system.
- The HG 3500 supports only phoneadapters that do not require their own B-channel. The following adapters are not supported: phone-adapter, a/b-Adapter, S0-adapter and V.24-Adapter.
- Autoset Relocate, Teleworking V2.6 and Workstation Protocol are not supported with HiPath HG 3500.
- With HiPath HG 3500, payload switching between the IP clients is supported. That means that the HiPath 4000 switching matrix is not involved in the payload connection and all calls between two IP phones are switched in the IP network (see Section 2.5.6, “DMC Considerations” for more details).
- HiPath HG 3500 line gateways do not operate in a load-sharing mode - there is a fixed assignment of the IP phones to one HiPath HG 3500 gateway.
- HiPath HG 3500 gateways can be configured as a standby gateways providing backup capabilities in case of gateway failure (see Section 6.15.2.2, “Standby Gateways” for more details).
- ‘Oversubscription’ is possible, meaning that more IP phones per gateway can be configured than there are available connections (maximum of 240 subscribers).
- The HG 3500 integrated gateway does not interoperate with 3rd party (e.g. H.323/H.450 or SIP compatible) IP phones/clients.
- The HG 3500 integrated gateway requires a static IP address.
- All IP phones do support DHCP and are supported in DHCP mode via the HG 3500 gateway. Note that a DHCP server has to be configured in the IP network; otherwise static IP addresses are required for all clients.
- The connection of analog devices via a HiPath AP 1120 analog gateway is supported. For more details please refer to the E-Doku pages in the intranet (http://netinfo2db.icn.siemens.de:8080/edoku/jsp/search.jsp?uc=search&string=1120).
- NTP (Network Time Protocol) is not supported on the HG 3500 because there is no real-time clock chip on the gateway card.
- Full user mobility is supported within a single system and networked systems.

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4 Features

The HiPath HG 3500 line gateway provides a unique set of features described in the following sections.

4.1 Gateway Functionality

Each HG 3500 gateway provides TDM to IP conversion and vice versa for up to 60/120 connections simultaneously. Two versions of the card are available (60 or 120 connections version) depending on the traffic needs of the specific application.

Up to 240 users per gateway are supported. This number depends of course on the traffic needs of the individual users (a 60 connection GW can support 240 users with 6 C.C.S each).

4.2 Resource Management

In a real, complex IP network the available bandwidth is typically not uniform in all sectors.

The Resource Manager (RM) can administer and monitor the bandwidth for up to 800 sectors in a given IP network.

The RM updates a cluster matrix whenever a call is setup or torn down. The matrix allows determination whether there is a resource shortage in any of the involved sectors. Based on the configured bandwidth and the actual bandwidth a call is either allowed to complete or rejected.

The RM calculates real bandwidth, taking compression settings, DMC, FAX, etc. into account.

The RM includes IP trunking connections, IP clients and IP Access Points in the calculations for the required bandwidth.

4.3 Direct Media Connections

HG 3500 gateways support Direct Media Connections (DMC also referred to as peer-to-peer) between two IP phones or an IP phone and an IP board like another HG 3500 or HG 3575. Payload between two DMC endpoints (DMC endpoints = IP phone, HG 3500/3575) is switched entirely in the IP network without involvement or the TDM switching matrix. This ensures highest quality voice and minimal delays because only a single hop (TDM to IP to TDM conversion) is required.

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Note that invoking any feature that results in a multi party call (more than 2 parties) will route the payload through all gateways in the payload path (same as in HiPath 4000 V1.0). This may result in undesirable delays in certain scenarios (see Section 2.5.6, “DMC Considerations” for more details).

4.4 Mobility

HG 3500 gateways support mobility.

HFA Mobility provides all functions and features that are available to a user at his “home” IP phone at any IP phone within a HiPath system or network. This includes identical user interfaces and user privileges.

A simple optiGuide supported logon procedure allows login into any IP phone within a HiPath network. The selected phone becomes the user’s temporary home phone including all personal settings. The actual home phone is being logged off as soon as the subscriber logs on to another IP phone. Calls to the home phone are forwarded as defined for CFNR (Call Forwarding No Reply).

4.5 Secondary Clients

HG 3500 gateways support optiClient 130 “Secondary Clients”.

- Secondary clients are optPoint 130 soft-clients configured with the same phone number as a regular IP phone.
- Secondary Clients do not require a ComScendo license.
- Secondary Clients require an optiClient 130 SW license.

The standard H225 Signalling Port is 1720 and this port is used at the OC130 to establish calls from the board to the OC130. For the OC130 Client it might be necessary to use a different port. In the case that an other H323 application is running in parallel to the OC130 it is possible to configure a different H225 Signalling Port on the OC130. The OC130 informs the HG 3500 at registration time and the HG 3500 will use this port for call establishment.

The OC130 can be used as a non standard VPN client. In this configuration the HG 3500 checks the delivered IP address and the real address on the connected CorNetTC socket and informs the OC130 about its real IP address when these 2 addresses are different..

Benefits of Secondary Clients:

- Secondary clients provide **remote** access to all HiPath 4000 features using an optiClient 130 soft client.

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- Starting the optiClient 130 on a PC from any location **automatically** logs off the office IP phone (associated by the same phone number) and provides the same feature set and class or service to the end-user as the office IP phone.
- After the remote user returns to the office, the IP phone will still be in the logged off state and the user is prompted to start the phone. This will put the IP phone into a normal operation mode until the IP phone is logged off again by an activation of the associated optiClient 130.

4.6 Standby Gateways

The HG 3500 supports standby gateways that protect multiple gateways against failure. See Section 4.15.2.2, “Standby Gateways” for more details.

4.7 Secondary Gateways

The HG 3500 supports secondary gateways that provide full redundancy to IP subscribers. See Section 4.15.2.3, “Secondary Gateways” for more details.

4.8 Voice Compression

The HG 3500 integrated gateway supports standard G.711 encoding at 64Kbps. Compression according to G.729 and G.723 is supported as well.

Of course the actual bandwidth requirements per connection depend on the added IP overhead and various other settings (see Section 2.5.4, “Required Bandwidth per Connection”).

Note that the voice compression as well as the gateway functionality is performed on DSP modules.

The on-board DSP module can process 60/120 channels of G.711, G.729 or G.723 encoding including VAD, CNG and echo cancellation.

Wideband codecs according to G.722 are supported between optiPoint 410 /optiPoint 420 IP phones. Note that the gateway itself does not terminate G.722 voice payload.

4.9 Voice Activity Detection (VAD)

Voice activity detection serves to save bandwidth in the IP network during pauses in speech.

Based on the knowledge that only one partner usually speaks at a time, while the other partner listens, the bandwidth seized during a call is only really used in one direction (speaking station -> listening station). In the other direction (listening station -> speaking station), only ambient

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noise and “silence“ are transmitted. Voice activity detection makes use of this knowledge, interrupts the data transmission and drastically reduces the data rate as soon as silence is detected. As soon as voice activity is detected again, transmission for that direction is immediately re-established (with full bandwidth).

The resulting bandwidth reduction is in the range of 50% to 75% which is very significant.

The VAD classmark is deactivated by default, but can be activated at any time for voice connections.

VAD must not be activated in the case of fax, modem and digital data connections!

4.10 Comfort Noise Generation (CNG)

While using **VAD**, the DSP at the destination emulates background noise from the source side, preventing the perception that a call is disconnected.

4.11 Echo Cancellation

The HG 3500 integrated gateway supports on board echo cancellation for up to 60/120 channels (performed on the on-board DSP modules) compliant with the ITU-T G.168 standard.

Given the relatively long delays inherent to IP telephony, (echo becomes more noticeable the longer the delays) echo needs to be removed prior to transmission.

4.12 QOS Support

VLAN-tagging according IEEE 802.1p/q on Layer 2 as well as DiffServ (defined in RFC 2474) on the IP Layer have been implemented in order to provide the best possible voice quality using an IP network.

Of course all switches and routers in the customer’s IP network must support IEEE 802.1p/q and/or DiffServ prioritization in order to take advantage of these mechanisms.

4.12.1 Real Time Port Monitoring

The HiPath 4000 system monitors a number of network parameters that can affect QoS between IP line gateways and phones. These parameters are used to troubleshoot and quickly locate IP network problems.

The following parameters are monitored

- Delay for VoIP payload connections between IP clients and IP gateways.

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- Lost packets on VoIP payload connections between IP clients.
- Jitter for VoIP payload connections between IP clients.

4.12.2 Signaling Connection Monitoring

The HiPath 4000 permanently monitors the IP connection between HiPath 4000 and each IP phone with a “Supervisory Connection“. In the case of problems the line will be deactivated.

4.12.3 Supports the Feature QDC

The HiPath IP Service QoS data collection provides a functionality to collect data from HiPath products to analyse speech and network quality. The collected information is sent to a PC application called QCU. For a detailled description of this feature refer to the QDC service documentation.

The goal of the HiPath IP Service QoS data collection feature is

- to reduce the overall effort for a QoS problem analysis,
- to increase the remote clearance rate,
- and to allow early recognition and prevention of network problems impacting voice quality.

4.13 Physical Interfaces

The HG 3500 is a standard HiPath 4000 card that uses the same form factor as any other standard line or trunk card. The card provides RS-232/V.24 as well as Ethernet interfaces.

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HG 3500 Front View

The HG 3500 provides three interfaces that are accessible to the user:

1. One RS-232/V.24 interface (serial port) classified as Data Terminal Equipment (DTE) on 9 pin Submin-D male connector used for test purposes only.
2. One 10/100 Base-T Ethernet interface for future use that provides a standard RJ45 type connector.
3. One 10/100 Base-T Fast Ethernet interface. This is the interface that provides the payload connection to the remote nodes. This LAN interface connects typically via IP switches to the customer's IP network. A standard RJ45 type connector is used.

4.14 Security

4.14.1 Access for Administration

Authentication methods are used for access to administration.

In order to protect all files and debug info on the HG 3500, access via LAN to HTTP, TELNET and FTP is disabled per default. Access to these files is only possible via the TAP/service PC through a PPP connection. HTTP, TELNET and FTP are accessible via the service connection. Note that a valid login and password is required for using TELNET and FTP.

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4.14.2 Access to SNMP

The acces to SNMP is restricted via read and write Community strings. These Community strings can be configured with the **WBM > Maintenance > SNMP > Communities**.

4.14.3 Security in CorNetTC Registration

The log-on between the IP phones and HiPath HG 3500 is secured via SHA1. The payload and signaling connections are not encrypted.

4.14.4 H.235 Security

When this feature gets activated all messages between the HG 3500 and the IP phones are authenticated. Authenticated messages will contain a Crypto Token element. As Crypto Token handling requires precise time and therefore the local system time is distributed cyclic to the IP endpoints.

Generation

To activate the H.235 security feature on the board, you set the security flag using the AMO ZANDE. This activates H.235 data in the AMO CGWB on the board.

Once you have activated the H.235 security feature with the AMO ZANDE, you must reboot the board to activate the changes.

With the parameter GLOBID1 and GLOBID2 you can administer the gateway ID.

```
CHANGE-ZANDE:ALLDATA,H235SEC=YES;

CHANGE-CGWB:MTYPE=CGW,LTU=<ltu no>,SLOT=<slot no>,
TYPE=H235DATA,SECURITY=<parameter>,GLOBID1=<string>,GLOBID2=<string>,TIMEWN
DW=<number>,GLOBPW=<password_of_the_gw>;
```

4.15 Reliability

4.15.1 Duplex System Support

The HG 3500 IP line gateway fully supports duplex HiPath 4000 systems.

4.15.2 Survivability Options

4.15.2.1 Line Gateway Redundancy

There are two ways to provide redundancy and increase availability for IP clients:

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1. Adding one or multiple **standby gateways** to the system protects against individual gateway failures
2. Providing full redundancy for IP clients via **secondary gateways** will protect against higher level failures, like entire Access Point or host failures.

4.15.2.2 Standby Gateways

One or multiple standby HG 3500 IP line gateways can be defined in the system that will take over in case any of the installed line gateways fails.

This concept is very efficient and cost effective because a single gateway can protect multiple gateways against failure. However, a single gateway cannot protect against multiple gateways failing simultaneously, which is highly unlikely.

In case of a failure, the system will reprogram a standby gateway with the parameters of the failed gateway which will enable the IP clients to re-login and resume standard operation.

IP phones will automatically register with the activated standby gateway and no administrative action is required. Note that users keep the same features and extensions while operating off the standby gateway.

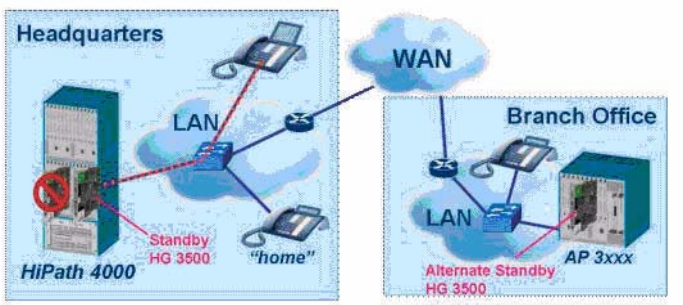

Figure 4-1 HG 3500 Standby Gateway Operation

Standby gateways can be located in the host system and/or on an IP Access point. The only requirement is that all active and standby line gateways have to reside in the same local IP subnet.

Important
Standby gateways and IP clients have to reside within the same system!
E.g.: a standby gateway located in one system cannot control IP clients controlled normally by a gateway located in another system.
Standby gateways at IP Access Points will not protect IP users at the host against a host failure because failures at higher levels (e.g. shelf, AP, host or power failures) will not automatically trigger a switchover.

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For more details please refor to Chapter 14, “Standby Board HG 3500”.

4.15.2.3 Secondary Gateways

In order to protect against higher level failures (e.g. Access Point, host failures) secondary gateways can be added to the system. A secondary gateway is an additional, fully configured gateway for an IP client located anywhere within a HiPath 4000 system. Note that each IP user that is backed up via a secondary gateway will have 2 extensions, e.g. x1333 on the primary gateway and extension x5333 on the secondary gateway.

In case communication to the primary gateway is lost (e.g. due to a shelf or host failure), the IP phone will attempt to register with the secondary gateway. As long as the secondary gateway is operational and IP connectivity is available, all phones backed up with secondary gateways will register with their secondary gateway and will be fully operational.

While registered with the secondary gateway the users will have all features available that have been enabled on the secondary extension. Incoming calls terminating on the primary extension will be automatically forwarded to the secondary extension using a new feature called “Alternate Routing on Error”.

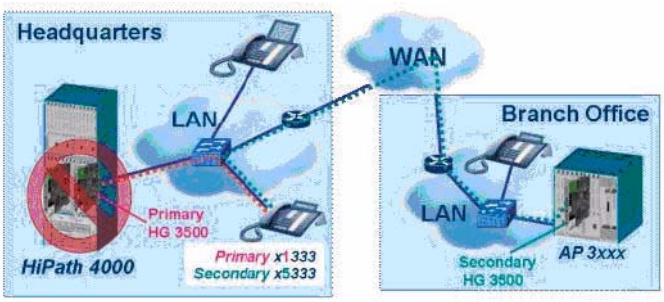

Figure 4-2 HG 3500 Secondary Gateway Operation

In order to minimize the number of secondary gateways and additional trunks required for operating in failure mode, the following measures can be taken:

- Secondary gateways can be configured with a higher blocking rate, which will limit the number of IP users that can make concurrent calls.
- Minimize the additional trunk required for secondary gateways via “undertrunking”.

Note that these measures are entirely optional and up to the customer’s preference. However, it may be a reasonable approach to limit resources (and thus cost) for operation in failure mode because this is a scenario that is very unlikely to become reality.

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Important
Secondary gateways and IP clients have to reside within the same system!
Secondary gateways can automatically backup any IP user as long as the secondary gateway is operational and IP connectivity between the IP client and the gateway is available.

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5 General Information on How to Configure a HG 3500 V4 Common Gateway

5.1 General Information

Multiple Feature Support (MFS) - Single Feature Configuration

The HG 3500 V4 common gateway can be configured as a multiple feature support (MFS) or single feature configuration.

An example of a multiple feature support configuration can be found in Chapter 8, “Multiple Feature Support Configuration at the Common Gateway (Example)”.

Redundant LAN interface

The feature described in the document “IP Distributed Architecture (IPDA) and Access Point Emergency (APE) Appendix E.5, “Redundant LAN Interface” in the document “IP Distributed Architecture (IPDA) and Access Point Emergency (APE)“ is supported. However, if the WAML function is configured, this feature is not supported.

Overbooking

For overbooking, more stations (**LINECNT**) are configured than the number of actual subscribers (**BCHLCNT**). The actual number of subscribers is configured for the B channels.

Example:

Five employees are working at a warehouse. However, the warehouse is big enough to house 10 terminals. As only five employees can simultaneously make and receive calls, only five B channels are required.

Parameter: LINECNT=10, BCHLCNT=5

Changing the common gateway configuration

Please note that the entire board must be reconfigured if changes are made to the common gateway configuration.

AMOs

- The STMI boards are configured in HiPath 4000 V3.0 using the AMO HFAB and the AMO STMIB. In HiPath 4000 V4 and later, these boards are configured with the AMO CGWB.
- The NCUI board is still configured with the AMO STMIB.
- The AMO BFDAT for block configuration is new in HiPath 4000 V4.

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- Functions are consolidated on a single board using the AMO BCSU.
- The DB line range of a board must be consecutive.
- The lines configured for a board cannot be subsequently modified. The entire board must be reconfigured if additional lines are required on a board.
- The parameter FCTID in the AMO BCSU must always be set to 1 in HiPath 4000 V4 as this parameter is used in HiPath 4000 V2.0 and V3.0. In HiPath 4000 V3.0 and earlier versions, this parameter is used to determine the function of the STMI board (HFA, IPDA, trunking, etc.). In HiPath 4000 V4 (and later), this is defined with the AMO BFDAT.

5.2 Rules

- The parameter for the functional block (**FCTBLK**) can be freely assigned. It may not, however, remain unassigned.
- A completed (configured) functional block may be assigned to one or more boards.
- The parameter for the boards to be used (**BRDBCHL**) determines how many B channels are available to the board.

  If the value **BCHAN60&BCHAN120** is set, an STMI[1] with 60 or 120 B channels can be used. This value is also useful if a small STMI with 60 B channels becomes defective. This can then be replaced with a large STMI with 120 B channels. It is not possible to replace a large STMI with a small one.
- Parameter **UNITS**
  - 1 unit corresponds to 10 B channels
  - If the number of units (**UNITS**) is not specified for the configuration, 10 B channels (**UNITS=1**) are configured for each circuit.
  - Up to three units can be specified for each circuit.
  - The total number of B channels for the function is calculated by multiplying the number of circuits (**LINECNT**) by the number of B channels in a unit (**UNITS**).
    Example: LINECNT=4, UNITS=3. 4 multiplied by 3 multiplied by 10 equals 120 B channels.
- If an IPDA function (HG3570) is to be configured for a multiple feature configuration, this must be configured first.
- For **IPDA**, only the number of B channels (**BCHLCNT**) must be specified.
- For **IP trunking**, the number of circuits (**LINECNT**) and the number of units (**UNITS**) must be specified.

1. STMI stands for STMI2 (Q2316-X, Q2316-X10) and STMI4 (Q2324-X500,Q2324-X510)

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- For **HFA** and **SIP**, the number of circuits (**LINECNT**) and the number of B channels (**BCHL-CNT**) must be specified.

If reserved HFA or SIP circuits are to be configured, the B channels designated for this purpose must also be specified here.
This is not necessary for reserved trunk circuits as the assignment is performed based on the number of units (**UNITS**).

- For **WAML**, only the number of units (**UNITS**) must be specified.

Only one circuit is possible for WAML.
This parameter can be omitted if **UNITS=1**.

- **Reserve function**

  Since the board configuration can only be modified by removing the board, an option has been created that allows users to reserve circuits for use at a later stage. If this feature is to be used for the functions HG3530, HG3540 or HG3550, the relevant function must be configured directly after the actual function (HG3550&HG3550R, for instance). The Reserve function must always be specified after the actual function (i.e. at the end).

  The combination HG3550&HG3530&HG3550R is not permitted as this would lead to invalid circuit distribution (Trunk - HFA - Trunk).

  It is not possible to configure several Reserve functions on a single board.

  The reserved circuits can be subsequently converted to usable circuits with

```
CHANGE-BCSU:TYPE=IPGW,LTU=<LTU>,SLOT=<slot>,CHNGRSLN=<number>;

/*<number>: Number of circuits that should be converted to usable
circuits.
```

Now you must reset the board.
`RESET-BSSU:ADDRTYPE=PEN,LTU=<ltu>,SLOT=<slot>;`

- The **STANDBY** function can only be configured as a single feature.
- Twelve single feature standard profiles were created (see Chapter 9, “Single Feature Standard Profile for HG 3500 V4”). These can be assigned with the AMO BFDAT.
- You can configure a functional block with

  `CHANGE-BFDAT:`**`CONFIG=OK`**`,FCTBLK=<number>,`**`ANSW=YES`**`;`

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You can check the status with `DISPLAY-BFDAT:FCTBLK=<number>;`

If the configuration of the functional block is complete **STATUS=OK** is displayed.

If a configuration error is detected when the block configuration is complete, the functional block must be deleted (`DELETE-BFDAT:FCTBLK=<number>,ANSW=YES;`) and reconfigured.

If the configuration of a functional block is not complete **STATUS=CONT** is displayed. The functional block may not be assigned to a board. This is refused by the AMO BCSU with the **Fault message F89**.

Fault message F89

```
H500:  AMO BCSU  STARTED

F89: THE GIVEN FUNCTIONAL BLOCK IS NOT COMPLETELY CONFIGURED.

     PLEASE FINISH CONFIGURATION BY MEANS OF AMO_BFDAT FIRST.

AMO-BCSU -54       BOARD CONFIGURATION, SWITCHING UNIT

ADD NOT COMPLETED;
```

5.3 Restrictions

- Only one trunking protocol can be configured for each board (AMO CGWB). There are no restrictions on interworking with other functions.
- The entire board must be reconfigured if the changes are made to the configuration.

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6 Multiple Feature Support Configuration at the Common Gateway (Example)

6.1 Configuring Functional Blocks with the AMO BFDAT

Some examples

- Functional block 1: IPDA (HG3570)
- Functional block 2: IPDA (HG3570), IP trunking (HG3550) and HFA subscriber (HG3530)
- Functional block 3: IP trunking, HFA subscriber (HG3530) and reserve HFA subscriber (HG3530R)

Functional block 1

Functional block 1: Adding the IPDA function (HG3570)

```
ADD-BFDAT:FCTBLK=1,FUNCTION=HG3570,BRDBCHL=BCHAN120;
```

>>>>> IPDA with 120 B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=1,FUNCTION=HG3570,BCHLCNT=120;
```

>>>>> End configuration of this block

```
CHANGE-BFDAT:CONFIG=OK,FCTBLK=1,ANSW=YES;
```

Functional block 2

Functional block 2: Adding the functions IPDA (HG3570), IP trunking (HG3550) and HFA subscriber (HG3530)

```
ADD-BFDAT:FCTBLK=2,FUNCTION=HG3570&HG3550&HG3530,BRDBCHL=BCHAN120;
```

>>>>> IPDA with 30 B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=2,FUNCTION=HG3570,BCHLCNT=30;
```

>>>>> IP trunking with one circuit with three units (=30 B channels)

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=2,FUNCTION=HG3550,LINECNT=1,UNITS=3;
```

>>>>> HFA with 60 circuits with 60 B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=2,FUNCTION=HG3530,LINECNT=60,BCHLCNT=60;
```

>>>>> End configuration of this block

```
CHANGE-BFDAT:CONFIG=OK,FCTBLK=2,ANSW=YES;
```


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Functional block 3

Functional block 3: IP trunking, HFA subscriber function (HG3530) and reserve HFA subscriber (HG3530R)

The reserved HFA B channels must be specified during configuration of the HG3530 function as subscriber B channels are not accepted during reservation.

```
ADD-BFDAT:FCTBLK=3,FUNCTION=HG3550&HG3530&HG3530R,BRDBCHL=BCHAN120;
```

>>>>> HFA with 80 circuits with 80 B channels and 20 reserve B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=3,FUNCTION=HG3530,LINECNT=80,BCHLCNT=100;
```

>>>>> Reserve HFA subscriber with 20 circuits

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=3,FUNCTION=HG3530R,LINECNT=20;
```

>>>>> IP trunking with 10 circuits with one unit (=10 B channels)

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=3,FUNCTION=HG3550,LINECNT=10,UNITS=1;
```

6.2 Configuring the Common Gateway Board with the AMO BCSU

Assignment for functional block 1

```
ADD-BCSU:TYPE=IPGW,LTG=1,LTU=2,SLOT=37,PARTNO=Q2316-X10,FCTID=1,FCT-
BLK=1,IPADDR=198.16.16.45;
```

Assignment for functional block 2

```
ADD-BCSU:TYPE=IPGW,LTG=1,LTU=1,SLOT=31,PARTNO=Q2316-X10,FCTID=1,FCT-
BLK=2,IPADDR=198.16.16.31;
```

Assignment for functional block 3

```
ADD-BCSU:TYPE=IPGW,LTG=1,LTU=1,SLOT=61,PARTNO=Q2316-X10,FCTID=1,FCT-
BLK=7,IPADDR=198.16.16.59;
```

Converting reserved HFA circuits to usable circuits

```
CHANGE-BCSU:TYPE=IPGW,LTG=1,LTU=1,SLOT=61,CHNGRSLN=13;
```

6.3 Configuration of a IPDA

Configuring of an IPDA on the STMI2 board in 1-1-37 (BFDAT profile 1):

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AMO CGWB not necessary because the IP address is already configured with the AMO BCSU. The additional configuration of the IPDA (UCSU, APRT etc) must be done as before in HiPath 4000 V30.

6.4 Configuration of a HFA phone

Configuring HFA subscriber on the STMI2 board in 1-1-31 (BFDAT profile 2):

```
ADD-CGWB:LTU=1,SLOT=31,SMODE=NORMAL,IPADDR=198.16.16.54,NET-
MASK=255.255.255.0;

REST-BSSU:ADDRTYPE=PEN,LTU=1,SLOT=31,

ADD-SBCSU:STNO=7180,PEN=1-1-31-0,OPT=OPTI,CONN=IP2,COS1=33,COS2=30
,LCOSV1=9,LCOSV2=1,LCCOSD1=9,LCOSD2=1,STD=100;
```

6.5 Configuring SIP Trunking

Configuring SIP trunking on the STMI2 board in 1-1-61 (BFDAT profile 3):

```
ADD-CGWB:LTU=1,SLOT=55,SMODE=NORMAL,IPADDR=198.16.16.55,NET-
MASK=255.255.255.0,TRPRSIP=30;
```

The additional configuration of the IP Trunking Connection must be done as before in HiPath 4000 V30.

Only one trunking protocol can be configured for each common gateway board.

6.6 Completed and Uncompleted Functional Block

6.6.1 Uncompleted functional block

Functional block 4: Adding the functions IPDA (HG3570), IP trunking (HG3550), WAML and HFA subscriber (HG3530)

```
ADD-BFDAT:FCTBLK=4,FUNCTION=HG3570&HG3550&WAML&HG3530,BRDBCHL=BCHAN120;
```

>>>>> IPDA with 30 B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=4,FUNCTION=HG3570,BCHLCNT=30;
```

>>>>> IP trunking with one circuit and one unit (=10 B channels)

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```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=4,FUNCTION=HG3550,LINECNT=1,UNITS=1;
```

>>>>> WAML with one unit (=10 B channels)

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=4,FUNCTION=WAML;
```

>>>>> HFA with 70 circuits and 70 B channels

```
CHANGE-BFDAT:CONFIG=CONT,FCTBLK=4,FUNCTION=HG3530,LINECNT=70,BCHLCNT=70;
```

>>>>> Do not end configuration of block

```
CHANGE-BFDAT:CONFIG=OK,FCTBLK=4,ANSW=NO;
```

Assignment for functional block 4

```
ADD-BCSU:TYPE=IPGW,LTG=1,LTU=1,SLOT=43,PARTNO=Q2316-X10,FCTID=1,FCT-
BLK=4,IPADDR=198.16.16.43;

H500:  AMO BCSU  STARTED

F89: THE GIVEN FUNCTIONAL BLOCK IS NOT COMPLETELY CONFIGURED.

     PLEASE FINISH CONFIGURATION BY MEANS OF AMO_BFDAT FIRST.

AMO-BCSU -54       BOARD CONFIGURATION, SWITCHING UNIT

ADD NOT COMPLETED;
```

If the configuration of a functional block with the AMO BFDAT is not completed, the block cannot be assigned to any board with the AMO BCSU.
The functional block must be completely configured with the AMO BFDAT before the command can be successfully run.

6.6.2 Completed configuration block

>>>>> End configuration of block

```
CHANGE-BFDAT:CONFIG=OK,FCTBLK=4,ANSW=YES;
```


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7 Command Line Interface CLI at HG 3500

7.1 General Information

The common gateway supports a **C**ommand **L**ine **I**nterface (CLI) for installation and basic configuration, e.g. IP infrastructure. In V.24 CLI it is possible to change security relevant data (e.g. SSL Configuration), because the V.24 is considered to be secure. Additionally the CLI allows the monitoring of important counters and statistics.

The CLI can be accessed via V.24. The CLI can not be accessed via Telnet because it is an unsecure protocol.

To get an overview of the commands type in the command `help` and you get an alphabetic list of all commands.

The basic facilities of the CLI are described below. In the following sections the CLI commands are divided into six command type groups:

- General Operations
- Access control
- Gateway Setup
- Image/File Handling
- Maintenance
- SSL for WBM

7.2 General Operations

When starting a session the administrator is asked for authentication. That is done by entering the admin name and the password.

- To leave the session use the

  ```
  logout
  ```

  command.
- The list of all supported commands except the hidden commands can be obtained with:

  ```
  help
  ```


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7.3 Access control

- The configuration write access has to be acquired before a store, upload or download command can be done. Because of the implemented “soft lock“ handling, at first a check if somebody else has set the write access is required.

```
who has write access

get write access

release write access
```

7.4 Gateway Setup

To permit system initialisation and basic management configuration activities following commands are needed.

- Setting and changing the gateway name:

```
set hostname <hostname>
```

- Setting and changing the IP-Address for the ethernet port:

```
set ip address <ip address>

set ip subnet <ip subnet mask>
```

  A set or a change of the IP-address or IP subnet for the ethernet port will probably require a gateway reboot to become effective.

- Setting and changing the IP-address of the default gateway from static routes table:

```
set default gateway <ip address>
```

- Display/change choosen identifier:

```
get id <parameter name>

set id <parameter name>
```

7.5 Image/File Handling

In common gateway software configuration and distribution as well as upload and download of configuration data via CLI is not required because it is done via WBM.

Additionally operations for analysing event and trace data are supported.

The trace /event logs are available as:

```
/trace/trace.txt
/trace/trace.bak
```


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```
/evtlog/evtlog.txt
/evtlog/evtlog.bak
```

7.6 Maintenance

The maintenance commands permit the current operational status of the gateway to be inspected, and provides access to diagnostic tools and interface and gateway controls.

Display

- Commands which provide information on the gateway's software configuration:

  ```
  show version
  ```

  ```
  show uptime
  ```

- Display of IP-address, subnet and gateway:

  ```
  show all parameters
  ```

- Display of hostnames and IP-addresses:

  ```
  show host
  ```

- Get the name of the gateway:

  ```
  show hostname
  ```

- Display of arp-cache:

  ```
  show arp cache
  ```

  It is also stored in the bootline as targetname.

- Display of the IP address and subnetmask for the ethernet port:

  ```
  show ip address
  ```

  ```
  show ip subnet
  ```

- Showing the time will display the time and the date:

  ```
  show time
  ```

- Command to get the IP address of the default gateway from the static routes table:

  ```
  show default gateway
  ```

- Command to display the static routes entries:

  ```
  show routes
  ```

- To display the statistics of the interface table:

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```
show if counters
```

- To list all existing interfaces:

```
show interfaces
```

- To get admin and operating states:

```
show if states
```

Ping and tracert

- Diagnosis Commands:

```
ping <ip address>
```

Target shell

- vxWorks shell logon/logout:

```
shell
```

```
exit
```

Gateway Reboot

From the administrator point of view two different ways of a reboot command are of interest. At first there is the need to reboot the gateway with the current configuration. On the other side there could be the need to support a configuration data exchange, i.e. to take a configuration data file from extern or to skip the latest configuration data storage and take the next older one.

It is in the responsibility of the administrator to coordinate a gateway reboot!

- Normal reboot of the gateway, using the current configuration data:

```
reset
```

- Reset any configuration data to factory defaults and reboot:

```
reset factory
```

- Special reboot of the gateway using an existing self-extracting image in order to complete a software download:

```
activate software
```

7.7 SSL for WBM

SSL for WBM (i.e. https) is enabled in the factory delivered status. It cannot be disabled.

To permit a basic configuration of SSL following commands are needed.

- Display the fingerprint of the currently active certificate for WBM access via https.

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```
show fingerprint
```

Before accepting a certificate warning in the browser, it is strongly recommended that the administrator should compare the fingerprint of the certificate displayed in the browser against the fingerprint shown in CLI. The certificate must be accepted only, if both fingerprints are identical!

ip address

The parameter <ip address> is a string in the form of x.x.x.x and x is an integer (e.g. 1.2.3.4).

hostname

The parameter < hostname > terms an arbitrary name for the gateway and it must be a string of characters (e.g. set hostname Gateway1). It corresponds with the boot line parameter “targetname“.

ip subnet mask

The parameter < ip subnet mask > is a string in the form of x.x.x.x and x is an integer between 0 and 255 (e.g. 255.255.255.224).

7.8 Changing the Login and Password for CLI

From HiPath 4000 V4 onwards for CLI login, the same accounts as for WBM login have to be used. The accounts can be set up and changed via AMO CGWB. The parameter ROLE defines the access rights.

As of HiPath 4000 V4, CLI is not released in two stages anymore!

```
CHANGE-STMIB:MTYPE=CGW,LTU=<ltu>,SLOT=<slot>,TYPE=WBMDATA,LOGINWBM=<user
login for wbm connection>,PASSWWBM=<password for wbm connection>,ROLE=<role
of the wbm user>;
```

The initial login as ENGR is

```
username: HP4K-DEVEL

Passowrd: Siemens2000
```

After successful login the following message appears:

```
Welcome to the HG 3575 V4.0 <LW-version> Command Line Interpreter.

vxTarget>
```


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<LW-version>

<LW-version> holds the currently loaded loadware version number (e.g. L0-TOS.10.030-004)

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8 Technical Data for HG 3500/3575

- **LAN Interface**
  - 10/100-Base-T Fast Ethernet interface to IEEE 802.3u
  - Autonegotiation, 10/100 Mbps, adjustable half/full duplex mode
  - IEEE 802.3 / DIX Ethernet II Standard Framing
  - Priority tagging (VLAN-TAG) to IEEE 802.1 p/q - optional (fixed assignment of priority to traffic types)
- **IP Stack**
  - IP Version 4
  - DiffServ prioritization to IETF RFC 2474 - optional (CodePoints freely adjustable)
  - Supports ICMP router redirection
  - TCP for signaling transport
  - UDP for transport of voice data to RTP/RTCP (IETF RFC 1889)
- **Transport Capacity for Voice**

BD Type	Part Number	Voice Channels	Remark
STMI2	Q2316-X	60	HW from HiPath 4000 V2.0
STMI2	Q2316-X10	120	HW from HiPath 4000 V2.0
STMI4	Q2324-X500	60	HW from HiPath 4000 V4
STMI4	Q2324-X510	120	HW from HiPath 4000 V4

- **Audio Codecs** (circuit-specific adjustment)
  - G.711 (PCM) with support for Annex 1 (Comfort Noise with Lost Packets) and Annex 2 (Voice Activity Detection with Comfort Noise Generation) Sample sizes: 20, 30 or 60 ms
  - G.729A (compression at 8 Kbps) and G.729AB (with Voice Activity Detection) Sample sizes: 20, 40 or 60 ms
  - G.723 (compression at 5,6 Kbps and 6,4 Kbps) Sample sizes: 30, 60 or 90 ms
- **Echo Cancellation** (circuit-specific adjustment)
  - Line echo cancellation to G.168 for 32 ms echo tail length

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- **Jitter Buffer** - fixed size, adjustable between 0 and 210 ms
- **Network Management Support**
  - SNMP Agent, SNMP Version 2, MIB2, Private MIB for Audio Stream Control
- **Voice delay** (mouth to ear)

The delay is made up of the following components:

- Time for filling the voice packet (SampleSize, Encoding Time):
  Sample size - possible values: 20, 30, 40, 60 ms
- Implementation-specific delay on the transmission end
- Delay caused by the transmission between the HG 3500/75 gateways in the IP network
- Size of active Jitter Buffer:
  Jitter Buffer
  - In legacy mode the average delay corresponds to the value set.
    The actual value is within the range [0 .. set value + 40 ms]
    If fax/modem signals or ISDN data are being transmitted, the average delay corresponds to the set value + 30 ms.
    The actual value is within the range [0 .. set value + 70 ms]
  - In static mode the network jitter to be compensated is configured. An additional 13 ms jitter buffer depth is added to compensate for the system's own jitter. In other words, the average delay corresponds to the set value + 13 ms.
    The actual value is within the range [0 .. set maximum value + 13 ms]
  - In adaptive mode it is best to take the set start/average value + 13 ms to calculate the average delay.
    The actual value is within the range [0 .. set maximum value + 13 ms]
- Implementation-specific delay on the receiving end

The implementation-specific delay on the sending and receiving ends is represented as a total value. This value depends on the codec type used (G.711/G.729) and, in the case of G.711, it depends on whether voice, fax/modem signals or ISDN data is being transmitted. The values are average values from a sequence of measurements. The actual values can be up to 5 ms lower or higher than the average.

These values may change in the course of fault correction and functional expansion. This does not always lead to a preliminary announcement or an immediate update of the manual.

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Codec Type	Implementation Specific Delay [ms]	
	Voice	Fax/Modem/Data
G.711	40	35
G.729	50	-

Table 0-1 Implementation-specific delay for HG 3500/ HG 3575

The delay (mouth to ear) is calculated as:

Sample Size **+ Network Delay + Jitter Buffer + Implementation Delay**

HG 3575 only:

- TDM switching network for 256 channels, full duplex, nonblocking
  Amplification adjustable for all channels
- Conference unit (64 ports)
- DTMF receiver (4)
- DTMF transmitter (4)
- Generation of signaling tones, announcements, music on hold
- Reference clock generator to ISO 11 573 Class III, TIA Stratum 4, CTR4 and CTR12/13.

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9 Questions and Exercises to the Common Gateway

Questions

9.1 Which boards can be used in a HiPath 4000 V4 as a HG3500?

9.2 What must be considered for a setup of function blocks with the AMO BFDAT?

9.3 Which restriction exists if the HG3500 is working with the function HG3550?

9.4 Which function ID must be used with the AMO BCSU for a setup of a Common Gateway board?

9.5 Which task the AMO STMIB has?

9.6 Which AMO for the administration of HG3530 doesn't exist anymore in the HiPath 4000 V4?

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Exercises

9.7 Check the predefined profiles (SFM and MFM) for the Common Gateway.

9.8 Create a Common Gateway with the HG3530 feature, 60 B channels and 120 subsribers.

Remark:

Use a predefined Function Block.

Add two HFA phones.

Add the required parameter in the HFA phones with the help of the Config Menu of the phone, WBM or DLS.

9.9 Create a Common Gateway in mixed modus.

Remarks

A board with 60 B channels should be used for

HG3550 with 10 B channels,

HG3570 with 20 B channels and

HG3530 with 30 B channels and 120 subscribers.

Do not use a predefined Function Block, make your own.

Stop after the BCSU - it is not necessary to do the administration for the IPDA respectivley IP Trunking

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10 Solutions

Questions

10.1 Which boards can be used in a HiPath 4000 V4 as an HG3500?

STMI2 Q2316-X

STMI2 Q2316-X10

STMI4 Q2324-X500

STMI4 Q2324-X510

10.2 What must be considered for a setup of function blocks with the AMO BFDAT?

If HG3570 functionality is part of the profile, it must be configured on the first position.

10.3 Which restriction exists if the HG3500 is working with the function HG3550?

Only one trunking protocol can be used (H.323 or SIP).

10.4 Which function ID must be used with the AMO BCSU for a setup of a Common Gateway board?

The function ID 1.

10.5 Which task the AMO STMIB has?

Administration of NCUI boards.

10.6 Which AMO for the administration of HG3530 doesn't exist anymore in the HiPath 4000 V4?

The AMO HFAB.

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Exercises

10.7 Check the predefined profiles (SFM and MFM) for the Common Gateway.

```
DISPLAY-BFDAT;
```

10.8 Create a Common Gateway with the HG3530 feature, 60 B channels and 120 subsribers.

Remark:

Use a predefined Function Block.

Add two HFA phones.

Add the required parameter in the HFA phones with the help of the Config Menu of the phone, WBM or DLS.

```
ADD-BCSU:MTYPE=IPGW,LTG=1,LTU=1,SLOT=14,PARTNO=Q2316-
X,FCID=1,FCTBLK=7,BCHL3530=60;

ADD-
CGWB:LTU=1,SLOT=14,SMODE=NORMAL,IPADR=1.40.11.50,NETMASK=255.255.255.0,DEFR
T=1.40.11.254,BITRATE=100MBFD;

REST-BSSU:ADDRTYPE=PEN,LTU=1,SLOT=14,

ADD-SBCSU:STNO=7180,PEN=1-1-14-
0,OPT=OPTI,CONN=IP2,COS1=33,COS2=30,LCOSV1=9,LCOSV2=1,LCCOSD1=9,LCOSD2=1,ST
D=100;

ADD-SBCSU:STNO=7181,PEN=1-1-14-
1,OPT=OPTI,CONN=IP2,COS1=33,COS2=30,LCOSV1=9,LCOSV2=1,LCCOSD1=9,LCOSD2=1,ST
D=100;
```

If the VNR feature is activated, the complete number(virtual node code and extension number) and the DPLN group (if overlapping) must be used!

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10.9 Create a Common Gateway in mixed modus.

Remarks

A board with 60 B channels should be used for

HG3550 with 10 B channels,

HG3570 with 20 B channels and

HG3530 with 30 B channels and 120 subscribers.

Do not use a predefined Function Block, make your own.

Stop after the BCSU - it is not necessary to do the administration for the IPDA respectivley IP Trunking

```
ADD-BFDAT:FCTBLK=21,FUNCTION=HG3570&HG3550&HG3530,BRDBCHL=BCHL60;

CHA-BFDAT:CONFIG=CONT,FCTLK=21,FCTBLK=21,FUNCTION=HG3570,BCHLCNT=20;

CHA-BFDAT:CONFIG=CONT,FCTLK=21,FCTBLK=21,FUNCTION=HG3550,LINECNT=1,UNITS=1

CHA-
BFDAT:FCTLK=21,CONFIG=CONT,FCTBLK=21,FUNCTION=HG3570,LINECNT=120,BCHLCNT=30
;

CHA-BFDAT:CONFIG=OK,FCTBLK=21;


ADD-BCSU:MTYPE=IPGW,LTG=1,LTU=1,SLOT=1,PARTNO=Q2316-
X,FCID=1,FCTBLK=21,BCHL3530=60;
```


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